

## **WASTE TREATMENT TECHNOLOGIES: APPROACH TO GHG EMISSION AND COST**

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### **Abstract**

Municipal solid waste may have a negative impact on the environment, causing pollution and greenhouse gas emissions (GHG) that contribute to climate change, if it is not treated. Treatment of waste is a key for sustainable development. Composting, anaerobic digestion and incineration are proven technologies for treatment of municipal solid waste. Selection of waste treatment depend on many factors, mainly cost, local conditions. Aim of this paper is to analyze different scenarios for waste treatment and their impact on environment and their cost.

### **Introduction**

The municipal waste management landscape in EU accession countries will change, due to legal obligation regarding waste management. [1,2,3]. Serbia is a candidate country for European Union membership (EU), must transpose and implement the total body of EU legislation, including chapter 22 Environment.

In developing countries, and Serbia as well, main deficiencies in waste management are weak and inefficient law enforcement mechanism, lack or weak capacity or motivation of staff, lack of finances for investments, lack of incentives for both local community and for the citizens. High share of biodegradable municipal waste going to landfill, like in South Eastern Europe countries [4,5,6]. Almost all packaging waste from the household which is sent to recycling is collected by an informal sector. Separate collection is not established.

In EU Member States where the disposal of waste is not high, and where there are no fees and charges for waste disposal, diversification of waste, particularly biodegradable waste from landfills and implementation of waste treatment technologies has been more slowly, unlike in countries where fee for waste disposal was introduced and gradually started to build the necessary infrastructure for waste management [6]. In addition, new member states e.g. Poland, Bulgaria, Romania, Croatia, still depend on landfilling, and treatment options are rarely in place. Therefore, still a large amount of waste is disposed of in landfills

The transposition and implementation of the Directive provisions legislation will be an extremely challenging task for the country. The aim of this paper is Aim of this paper is to analyze different scenarios for waste treatment and their impact on environment and cost, in Novi Sad Waste Management Centre.

### **Experimental**

The input for the analysis is morphological composition of MSW in NSWMR and generated MSW waste. In 2009. total amount of generated waste was 189.000 tones [7]. Out of this, 44% is biodegradable waste (see Figure 1).



**Table 2: Environmental and cost analysis of waste treatment**

	Investment cost (€)	Operating cost (€)	GHG emission (t CO <sub>2</sub> eq)
Composting	19,439,281	11,838,866	20,095
Incineration	73,326,217	73,326,215	974,487

In Table 3, are given costs for Scenario 1 and Scenario 2. Incineration plant, increase the cost, but also increase the savings in terms of GHG emission. Treatment of biodegradable waste will reduce only biodegradable waste for landfill, while residual waste will increase. Selection of incineration, will reduce the amount of waste sent to landfill as well, but will increase the cost of by-products treatment (fly ash and bottom ash). However, scenario 2 has a better GHG “balance” than scenario 1, thus contribute to reduction of GHG emission. Selection of waste treatment plant (scenario) will depend on many factors. One of the important factors will be the investment cost of the plant and economic sustainability of the plant. However, any of scenarios for waste treatment must be tailored to local conditions, because many proven technologies have fallen due to difficulties to adapt waste treatment to local conditions.

**Table 3: Cost and GHG emission of analyzed scenarios**

	Investment cost (€)	Operating cost (€)	GHG emission (t CO <sub>2</sub> eq)
Scenario1	19,439,281	11,838,866	20,095
Scenario 2	92,765,498	85,165,081	994,582

## Conclusion

Both analyzed technologies are proven waste treatment. Implementation of those technologies will be challenging task for the Novi Sad region. Decision makers will have to implement and introduce different mechanisms e.g. landfill ban, landfill taxes in order to divert the waste to treatment and reduce the GHG emission from landfill.

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